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ABSTRACT

A study investigated some of the ways in which phenomena are perceived and translated into speech, especially in the assignment of agents in a given situation. Subjects were 16 adults with infant children. The adults were shown the Visual Cliff series of pictures of an infant crawling to its mother across a glass sheet covering an open space with the appearance of varying depth, and asked to describe the pictures for someone who had not seen them and to state which of five areas of life (practical, aesthetic-moral, social, technical-physical, and care) concerned them most. The experiment was conducted in connection with a meeting giving parents information about guarding children against accidents. It was found that the subjects' stated concerns correlated with different perceptual approaches as illustrated by their observations, descriptions, and relations of environmental features. (MSE)

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The Perspective Structure in the Verbal Flow

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Abstract

The concept of agent is introduced into a psychological analysis of natural language. The agent component has a steering function in the development of a perspective throughout a text. This is shown by an experiment with the series of pictures from the Visual Cliff studies. The pictures have been used to examine individual differences in the perception of ecologically significant information. Through a numerical analysis perceptual syndroms have been demonstrated.

Human comprehension is conceived as a synthetic processing of pictorially or symbolically mediated information. Moreover, there is very little reason to doubt the preciseness, completeness, and efficiency of natural language as well as pictures, especially not when operating in a natural context. There is every reason to trust people's ability to use natural language in specifying unambiguously their perceptions of pictures. The theory that will be put forward in this paper rests fundamentally on the notion of the agent as the integrative component and as the steering function in the schematizing process expressed in verbal behaviour.

The ability of isolating the effect of the agent component so as to make available propriospecific information (Gibson, 1979) is the central concern of the experiment that will be reported here. By anchoring symbolic expressions in the schema model discussed in B. Bierschenk (1984a) it is possible to control the agent and to detect the perspective structure in a natural text. The underlying mechanism transforms through a twisting an organism and an environment into cognition. The consequence of this transformation is that perspective and viewpoints become available for experimental manipulation. By the perspective being manipulated it becomes tied to the A component of the AaO paradigm, while the manipulation of the viewpoints results in these becoming bound to the O component. The manipulation of both components gets its expression through the freezing or activating of the a component. The complementary roles of the A and O in this mechanism produce a communication process. In this process, particular viewpoints are selected in agreement with the perspective chosen, implying that the perspective is in the verbal flow.

The formalism proposed must control the choices and changes of the viewpoints as well as of the perspective. Characteristic of this transformation is that the organism and the environment only secondarily influence what is operating in the cooperation. In a manipulation of the cooperation, novel characteristics will emerge. As a consequence, variations in (1) type of symbols and

(2) function of symbols can be treated differentially. A resulting effect of the application of the formalism is that the zero hypothesis of comprehension can be defined as the freezing of perspective and viewpoint. In this freezing the symbol itself emerges.

The Symbolic Integrant

Inherent in the process of communication is the process of transforming meaningful behaviour into symbolic expressions. This transformation entwines the perspective and the viewpoints. An analysis of symbolic expressions and a study of comprehension can therefore not be done unless the perspective can be detached from the viewpoints and be controlled. Perspective control lies in the definition and specification of an agent. The function of the agent is to decide which viewpoints are focused upon in a given empirical context and in which way this focussing may be changed under textual transformations.

Textual transformations and changes in a symbolic representation of observations are abstract phenomena but, nevertheless, they are the prerequisites for the detection of the structural nature of the experiences and practice on which symbol development rests. This circumstance binds the structure of a text directly to the predispositions of the autonomous observer. The relations holding between a structure and an entire text are not only expressions of empirically founded transformations but expressions also of multivariability. For this reason, they are far too complex to be understood in other ways than by some graphical means.

A representation of observations through natural language presupposes not only a means by which the structures of the perspective and the viewpoints can be specified but, moreover, some method by which every verbal description could depict crucial structural information in such a way that a person is able to perceive its " affordance ", i.e. its meaning (Gibson, 1979). Each time an observable event structures the language of the observer, this language carries the information about this event. The relationship may be illustrated with the following formula:

Ø action Ø (1)

The information embedded in this schema (1) becomes accessible only to the extent that the agent and the objective of the action can be discerned. Through the Agent component the schema incorporates the constitutive function of the context and marks the transitive property of the observation by two place holders, that is, one dummy variable placed before and one after the action. Which variables will be manifested depends on what will be realized through the action component, for example, " study ".

? study ? (2)

In that the components have been operationalized in the model (2), structural affinity can be studied. One example of a manifestation of variables in natural language is the following expression:

The researchers observed infants (3)

The variables in this expression (3) must be regarded as belonging to an observation within the scientific context. In this context, the researchers are the ones who perform a series of actions, whereas the infants are the ones functioning as the objectives of the research. The relation researchers - infants is given in that the affinity between the A and the O components is the same each time their empirical representatives (the variables x_1, x_2, ..., x_n) occur simultaneously in the observation. The interest of the agent governs the choice of objectives, which means that the agent function must always be discernable, if the perspective underlying a verbal flow is to be visible.

Textual Transformation

Research does not primarily mean a scientific study of objects but rather of phenomena. Infants, for instance, may be supposed to represent the phenomenon of development. This suggests that development is a cooperative process, which presupposes the ability of

the organism to transmit the effect of experience through behaviour rather than through some unrelated characteristics of organs such as sight or body movements. This would imply a study of the infants' behaviour in an event sequence. The phenomenon, i.e. that which is scientifically interesting, is made clear through the infants' actions towards certain particular object(ive)s. If the researchers' observations are to be communicated, they have to be represented by a series of AaO relations such as they manifest themselves in the moment of observation.

Representation materializes in a linguistic processing of observations leading to a coherent form, i.e. a text. Depending on who is the text producer (observer) the distance to the moment of observation may be given a more or less explicit expression. Syntactic distance is expressed through a difference in the type of variables being realized. In a symbolic expression, the observer may take the function of the agent:

I (the infant) am crawling over the edge (4)

or he may observe the agent:

The infant is crawling over the edge (5)

Since these types differ in form but not in structure, they will be identically treated.

The observer may also express the observer function:

I observe that the infant is crawling over the edge (6)

The steering function of the A component lies in the specification of distance at the same time as it guarantees a cooperative action with and an adaptation to the empirical contexts. Thus the awareness of an event may be formalized with the following expression:

(A a (A a O, A a O, ...)) (7)

The application of the formula (7) on a text requires these functional differences of the observer in relation to the events to be controlled. For that matter, every observation must be or be made complete with respect to the affinity of the A and the O. This measure is necessary if the perspective structure of the text is to be lifted from its linguistic carriers and be separated from the objective structure.

Experiment

Method

Of particular importance for an experimental separation of a textual perspective from its objectives is the assumption that empirical observations are linguistically packeted in such a way that ecologically valid information can be detected. By ecologically valid information is meant the particular affordance that objects and events have at the moment they are being perceived. The experimental question to be investigated is:

> Does natural language reflect perspectival invariants in such a way that these can be represented through the AaO model?

An experimentally designed investigation of this question demands that both the perspective and the viewpoints can be controlled. Comprehension is dependent on cooperative changes in viewpoints and perspective. Differential studies of the variations have been carrid out by Eleanor Gibson and Richard Walk (1960). These experiments have a key function with regard to the study of structural relations between viewpoints and perspective the way they are reflected in meaningful behaviour (B. Bierschenk, 1984b). It is assumed that more than one viewpoint of the same type can be discerned and that, at the same time, the observer is able to change his perspective so that his viewpoints can be viewed from different angles. This double mechanism of change is of fundamental importance for comprehension, since it incorporates the autonomous observer into the symbolic expression.

Subjects. For a specification of the information that con-

cerns the perspective of a text, it would, in a strict sense, be sufficient to study only one observer's symbolic expressions of his empirical observations. Moreover, a differential analysis of functional variations in symbolic expressions prerequires a minimum of two. For a multivariate differentiation, more than two would be required. In the empirical investigation 16 subjects have given their expressions. Since the Visual Cliff experiments were performed with children of crawling age, parents having children of the same age were invited to participate. The experiment could be accomplished in connection with a regular control of 8-9 months old infants at a rural district's child care centre.

Material. It is assumed that pictures function as links between awareness and cognition. Of particular importance for a cognitive analysis of language is that the model (2) is capable of controlling the agent position. But this in itself needs not lead to a better representation of reality. The determination of the observer's position means, according to Gibson (1979, p 283) that the perspective incorporates the observer into the scene. Since a symbolic expression must incorporate both exterospecific and propriospecific information, it is of greatest import to study the capacity of natural language to carry differentiations of ecological kind and to give expression to an integration of experience into invariant structures.

The series of four pictures describing the Visual Cliff experiments (Gibson & Walk, 1969, p 65) constitutes the test material. The authors describe the pictures as follows:

> Child's depth perception is tested on the visual cliff. The apparatus consists of a board laid across a sheet of heavy glass, with a patterned material directly beneath the glass on one side and several feet below it on the other. Placed on the centre board (top left), the child crawls to its mother across the " shallow " side (top right). Called from the " deep " side, he pats the

glass (bottom left), but despite this tactual evidence that the " cliff " is in fact a solid surface he refuses to cross over to the mother (bottom right).

The ability to represent " mediated awareness " through language requires an abstraction and a description of invariants. Which structures will become accessible depends on which " higher order relations " having become visible through the language.

The subjects were given orally the task to describe the contents of the four pictures in such a way that anyone else who is not familiar with them would be able to make himself a conception of them. First they got (a) information about how to identify the glass surface, since this cue in the pictures (bottom left) has not been properly perceived as far as the pretests could show. The subjects then got the (b) instruction to regard the picture series as a conceptual whole, to make it possible for them to perceive the course of events. They were also (c) told to name the picture series, i.e. to give it a prototypical description. Task (b) was a written task and was performed before (c), which was a second step in the description process. Finally, a separate (d) questionnaire was presented in which the subjects were asked to mark which one of the following areas of life concerns them the most: (1) practical, (2) aesthetic-moral, (3) social, (4) technical-physical, or (5) care.

Procedure. The second author met the subjects for about 30 minutes pro occasion during some periods in the autumn of 1983 and the spring of 1984. The meetings were arranged in connection with information to parents concerning how to guard children against accidents. As locality for the meeting and the experiment served the waiting room of the centre and the experimental material thus could be presented as a natural part in the information the parents had come there for. Each subject received a photography of the page mentioned. Information about its source was given to them in connection with the distribution of the material, followed by the instructions to the task.

Numerical analysis. When the infant's behaviour on the visual cliff can be taken as an indication that the environment " affords " something for the child, this behaviour shows ecological significance. When an observer comprehends the affordance governing the infant's behaviour and reflects it wordly, the resulting text should mediate the significant aspects of the event pictured. The kind of texts produced by the subjects may be illustrated with this one:

> The child explores the table with touch and sight, and tries to find its way towards the unknown. The child reacts to the danger that it will fall down the edge and stops. Being a parent, one would naturally step in when the infant came nearer to the edge, which means that, perhaps, one steps in more often than one needs to.

When an analysis of the experimental texts takes its point of departure in the schema model (2) a strict dependency between textual elements become visible. The capacity of the model to synthesize successive segments in a progressive text analysis is founded in the steering and controlling function of the Agent component. Presumably, different agents have different functions in a text, and have been chosen to give expression to a particular awareness of objects and events. A differential analysis of the agent function can give information about which profiles may be thought to describe the awareness.

The purpose of this kind of analysis is to differentiate the agents of the text starting from the Objective component, which represents the viewpoints of the text. In such an analysis, it becomes necessary to determine the relational affinity of the observations. If this condition is utilized in an empirical analysis, the dependencies expressed in the agents' coincidences with the different kinds of viewpoints are taken into account.

Results

Depending on the perspective chosen the linguistic variables can be given different function. The values (3) they get allow the

reader to follow their positional shifts. A change of the function gives expression to a change in the perspective (I. Bierschenk, 1984). A first step in this analysis is the set-up of a series of matrices of the Nxp type. These make up the prerequisite for the ordering of the agents into groups. The distance between them is represented by vectors, whose components reflect the scores assumed to be descriptive. Thus the agents become measuring objects (N) and the objectives the columns (p), while the a component represents the affinity. Affinity or distance according to Ward's (1963) method, for example, is computed as the total sum of squared deviations of every agent (represented by a point) from the cluster to which the point belongs. At every cycle in the procedure, the pairs of clusters are brought together, whose amalgamation minimizes the loss of information, expressed as a minimum increase in the error sum of squares. The most desirable value of this function is the minimum value of .00.

Perspective separation. By observable events being linked on the basis of specific interests, a conceptualization takes place. Therefore, without due consideration to individual differences it is very hard to detect a perspective structure. Interests or motives are psychological constructs, which the motivation theories try to explain on the basis of notions such as drives and stimuli, or purposes and needs. The typology employed here does not build on any of these theories. The division of the subjects into interest groups aim at giving an indication of a personal way of " seeing " reality or constrain the phenomenon.

Based on indicated interest and not on profession or the like, the following grouping has been the starting-point in the separation of perspective structure:

1. Practical (1, 8, 12, 14)
2. Aesthetic-moral (4, 6, 11)
3. Social (2, 15, 16)
4. Technical-physical (3,10)
5. Care (5, 7, 9, 13)*

* Lacks structurability

This classification may be thought to facilitate the interpretation of the cluster analysis results without the need for assump-

tions of causality concerning the quality of the observed symbolic expressions or concerning assumptions about normally distributed sample scores (Tryon & Bailey, 1970, p 288). The procedure chosen has been executed with Wishart's(1982) CLUSTAN program. At the empirical definition of a cluster, two premises have been decisive: (1) There is an obvious break in the classification, or (2) the criterion value of .10 can be applied such that the resulting collinear clusters can be given a meaningful interpretation.

Practical. The process of concentrating the agents starts from an empirical grouping of the five agents present in the texts of this group. Figure 1 displays the result of the clusterings.

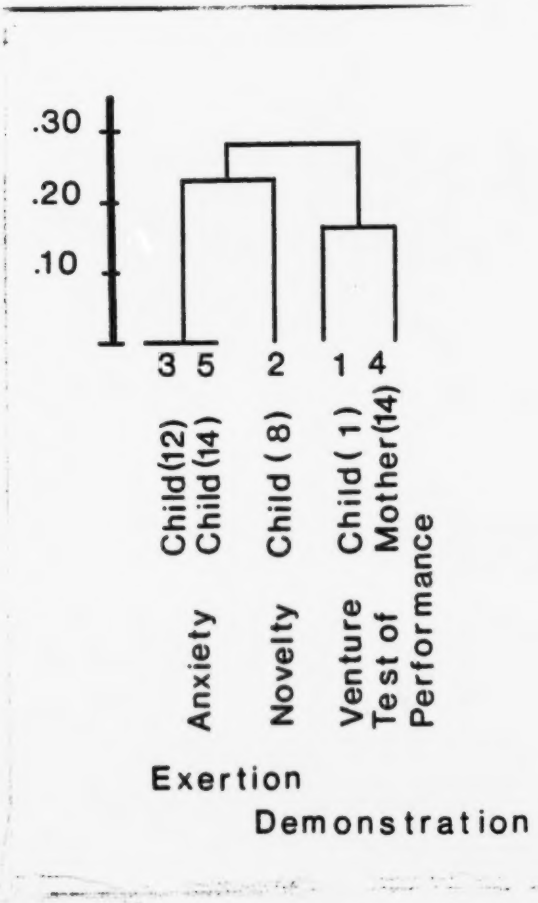

Figure 1. Perspective Structure: Practical

Clustering means that a minimally sufficient number of groups of agents can be determined on empirical grounds. On the basis of this, four clusters emerge. The grouping shows that only one pair of agents could be formed (12, 14) of which Anxiety is the typical characterization. The other agents are unique. But more important is that the structured configuration of the agents can be observed. This structure displays the agents in relation to each other (Jardine & Sibson, 1971). On the basis of the graphical presentation (Fig. 1) it can be determined the kind of operating structural connections. The structure depicted expresses in its entirety that Demonstration with one subcomponent, Exertion, is the kind of perspective of the practically concerned.

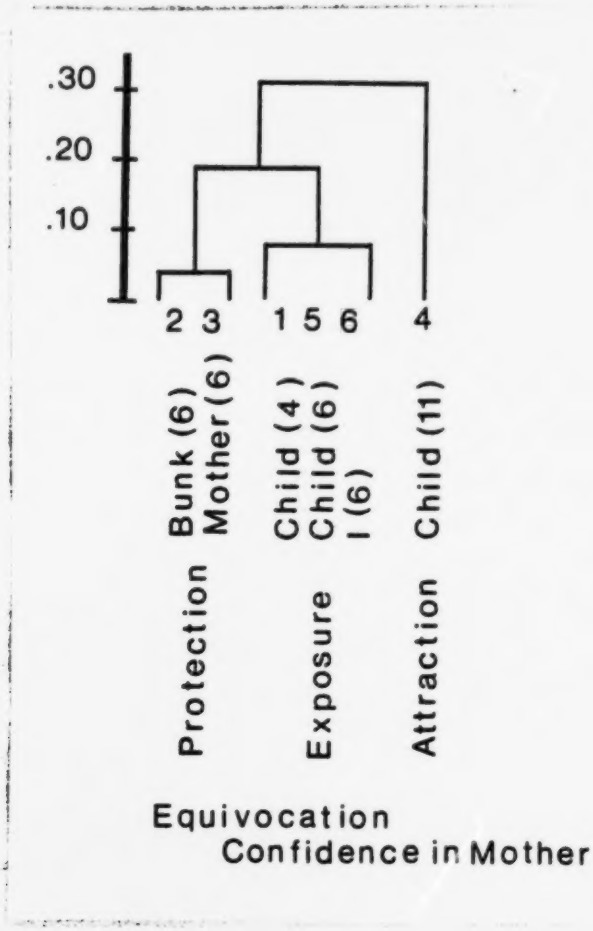

Figure 2. Perspective Structure: Aesthetic-Moral

Aesthetic-moral. The searches for the grouping that can represent the perspective configuration of the agents of this group has resulted in three clusters as shown in Figure 2. The agents that are closest to each other form two clusters. The first concerns Protection and the second Exposure. The total configuration graphed shows that the perspective of this interest group is on the overshadowing influence of the mother. The entire structure expresses Confidence in Mother with one subcomponent, Equivocation.

Social. A comparison of every agent with every other in the texts of this interest group reveals three clusters. The result of the analysis is shown in Figure 3.

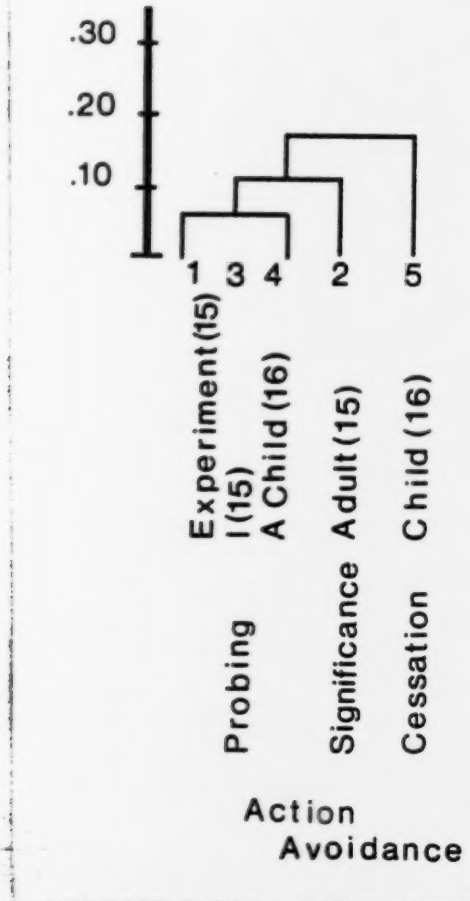

Figure 3. Perspective Structure: Social

The clustering differentiates the agents into two parts, one whose agents are characterized by the component Probing, the other in two unique agents related to Significance and Cessation respectively. The perspective structure graphed concerns Avoidance with one subcomponent, Action.

Technical-physical. The agents in the texts of this group are joint into two clusters. Figure 4 shows that one cluster represents a unique agent.

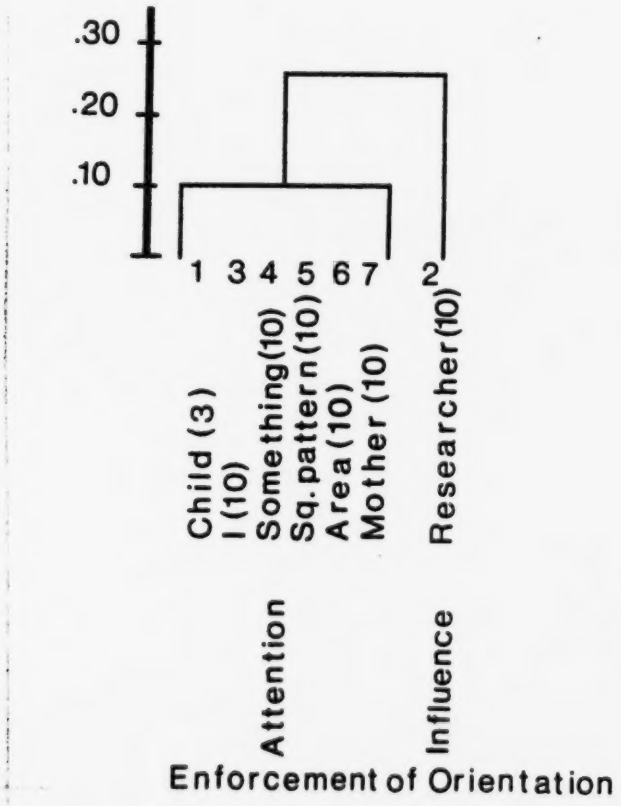

Figure 4. Perspective Structure: Technical-Physical

The unique agent is characterized as Influence(rs). The other cluster, which amalgamates the rest of the agents is characterized

by Attention. The configuration, on the whole, specifies a perspective structure which is an expression of an Enforcement of Orientation.

The ability of the method to abstract structural relations pertaining to the perspective of this group may be obvious to the reader by the following conclusion of subject number 10: " What the outcome of this was, the pictures give no answer to ".

Discussion

A comparison between the structural relations among the groups of interest formed show that the categories are not only different but also differently related to each other. The dissimilarities in perspective structure point towards perceptual syndroms. The comparison between the agents reveals information about how the environmental features are observed, described and related to the child's movement and aversion to hight. Thus the symbolic information existing in the verbal flow is directly picked up by the components of the model.

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